Set	Items	Description
S1	107641	CURVE()CRYPTOGRAPH? OR ELLIPTIC OR HYPERELLIPTIC
S2	49000	JACOBI?
S3	366	STICKELBERGER OR STICKERBERGER
S4	15	S1 AND S2 AND S3
S5	8	S4 NOT PY>1999
S6	8	S5 NOT PD>19990827
S7	8	RD (unique items)

File 8:Ei Compendex(R) 1970-2004/Apr W1
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File 239:Mathsci 1940-2004/May
(c) 2004 American Mathematical Society
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
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7/5/1 (Item 1 from file: 239)
DIALOG(R)File 239:Mathsci

02810414 MR 98h#11138

Amelioration d'une congruence pour certains elements de Stickelberger **quadratiques.**

Improvement of a congruence for certain quadratic **Stickelberger** elements

Bayad, Abdelmejid
Robert, Gilles (Institut Fourier, Universite de Grenoble I (Joseph Fourier), 38402 Saint-Martin-d'Heres, France)
Corporate Source Codes: F-GREN-F

Bull. Soc. Math. France
Bulletin de la Societe Mathematique de France, 1997, 125, no. 2, 249--267. ISSN: 0037-9484 CODEN: BSMFAA
Language: French Summary Language: English, French
Document Type: Journal
Journal Announcement: 9803
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (31 lines)

Let $E/{\bf C}$ be an **elliptic** curve and let $\Omega \subseteq {\bf C}$ denote its period lattice. Let $\langle \psi\rangle \subseteq E[p]$ be a cyclic subgroup of order $p > 1$ of the group of p-torsion points of $E({\bf C})$. Finally, let $\varphi \in E[p] \sbs \langle \psi\rangle$.

The authors study Ω- **elliptic** functions $D\sb \Omega(z, \varphi, \langle \psi\rangle)$ associated to the divisor $\sum\sb {\rho \in \langle \psi\rangle} (\varphi + \rho) - (\rho)$, which exist by the theorem of Abel- **Jacobi** and are determined up to a multiplicative constant.

These functions appeared quite frequently in the recent literature, mainly used for the construction of certain Lagrange resolvents with properties analogous to those of the classical Gauss sums. On the one hand the factorization of these resolvents led to Galois module structure results for rings of integers, and on the other hand it served for the construction of ``quadratic'' **Stickelberger** elements.

Unfortunately, almost every author chooses his own normalization for $D\sb \Omega(z, \varphi, \langle \psi\rangle)$, which makes it hard to compare the results. Bayad and Robert now introduce the very natural normalization $\lim\sb {z \rightarrow 0} D\sb \Omega(z, \varphi, \langle \psi\rangle) = 1$, which leads, after suitable specializations, to a beautiful additive distribution law (compare this also to similar formulas in papers of S.-P. Chan [J. Reine Angew. Math. 375/376 (1987), 67--82; MR 88j:11077] and R. Schertz [J. Number Theory 39 (1991), no. 3, 285--326; MR 92j:11130]).

Based on this the present authors improve on the results concerning quadratic **Stickelberger** elements of A. Bayad, W. Bley and P. Cassou-Nogues [J. Algebra 179 (1996), no. 1, 145--190; MR 96k:11131], which also served as a starting point for their investigations.

Reviewer: Bley, Werner (D-AGSB)
Review Type: Signed review
Descriptors: *11R27 -Number theory-Algebraic number theory: global fields (For complex multiplication, see 11G15)-Units and factorization ; 11R29 -Number theory-Algebraic number theory: global fields (For complex multiplication, see 11G15)-Class numbers, class groups, discriminants

7/5/2 (Item 2 from file: 239)
DIALOG(R)File 239:Mathsci

02773902 MR 98d#11061

Valuation q-adique et relation de distribution additive pour certaines fonctions q-periodiques.

q-adic valuation and additive distribution relation for certain q-periodic functions

Bayad, Abdelmejid

J. Number Theory

Journal of Number Theory, 1997, 65, no. 1, 1--22. ISSN: 0022-314X
CODEN: JNUTA9
Language: French Summary Language: French
Document Type: Journal
Journal Announcement: 9715
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (38 lines)
Let K be a local field, let $\overline K$ be its algebraic closure and let q be an element of $K\sp *$ with strictly positive valuation. The author takes advantage of the well-known fact that most of the classical q-expansions of modular or **elliptic** functions converge p-adically. Inspired by the recent paper by the author and G. Robert [``Une relation de distribution additive satisfaite par une famille de fonctions elliptiques'', Bull. Soc. Math. France, to appear] he proves local analogues of the results of that article.

Given natural numbers p,l such that $(p, l) = 1$ and a primitive p-torsion point $\psi\in\overline K{}\sp */q\sp {\bf{Z}}$, a ``local Siegel function'' associated to the subgroup $q\sp {\bf{Z}} \psi\sp {\bf{Z}}$ and a ``local discriminant function'' are defined in a quite natural way. In addition, the q-valuations of these functions, evaluated at certain torsion points, are computed.

Let $\varphi\in E[p]\sbs \langle \psi\rangle$ be another p-torsion point of $\overline{K}{}\sp */q\sp {\bf{Z}}$. Using the local version of the Abel- **Jacobi** theorem the author constructs a q-periodic function $D(\cdot,\varphi,\langle \psi\rangle)$ with given divisor $\sum\sb {\rho\in\langle\psi\rangle} ((\varphi\rho) - (\rho))$ and also provides an expression of D in terms of the Siegel functions and the discriminant.

The main result of the paper is then an additive distribution law which, for two l-torsion points $\alpha,\gamma\in\overline{K}{}\sp */q\sp {\bf{Z}}$, relates a certain sum of the functions $D(\cdot,\varphi,\langle\psi\rangle)$ with $D(\cdot,z\sb 0,\langle\alpha\psi\rangle)$, where $z\sb 0$ is an lp-torsion point depending on φ and γ. This distribution law may be considered as a local analogue of a resolvent formula studied by S.-P. Chan [J. Reine Angew. Math. 375/376 (1987), 67--82; MR 88j:11077].

In the appendix the author uses his results of the previous sections to simplify some of the local computations of his previous paper with the reviewer and P. Cassou-Nogues [J. Algebra 179 (1996), no. 1, 145--190; MR 96k:11131], where certain products of these functions (or their complex analogues) are used to construct quadratic **Stickelberger** elements.
Reviewer: Bley, Werner (D-AGSB)
Review Type: Signed review
Descriptors: *11G07 -Number theory-Arithmetic algebraic geometry (Diophantine geometry) (See also 11Dxx, 14Gxx, 14Kxx)- **Elliptic** curves over local fields (See also 14G20, 14H52) ; 11S80 -Number theory-Algebraic number theory: local and p-adic fields-Other analytic theory (analogues of beta and gamma functions, p-adic integration, etc.)

7/5/3 (Item 3 from file: 239)
DIALOG(R)File 239:Mathsci

02373112 MR 93f#11002
The arithmetic of function fields.
Proceedings of the workshop held at The Ohio State University, Columbus, Ohio, June 17--26, 1991. Edited by David Goss, David R. Hayes and Michael I. Rosen.
Contributors: Goss, David; Hayes, David R.; Rosen, Michael I.
Publ: Walter de Gruyter & Co., Berlin,
1992, viii+482 pp. ISBN: 3-11-013171-4
Series: Ohio State University Mathematical Research Institute Publications, 2.
Price: $59.95.
Language: English
Document Type: Book; Proceedings
Journal Announcement: 9305

Arithmetic of function fields; Workshop: Arithmetic of Function Fields; Columbus, OH, 1991
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (40 lines)
Contents: David R. Hayes, A brief introduction to Drinfeld modules (1--32); Y. Hellegouarch, Galois calculus and Carlitz exponentials (33--50); G. W. Anderson, A two-dimensional analogue of **Stickelberger** 's theorem (51--73); D. S. Thakur, On gamma functions for function fields (75--86); H. Oukhaba, Groups of **elliptic** units in global function fields (87--102); Ke Qin Feng, Class number ``parity'' for cyclic function fields (103--116); D. S. Dummit, Genus two **hyperelliptic** Drinfeld modules over ${\bf F}\sb 2$ (117--129); David Goss, A short introduction to rigid analytic spaces (131--141); Marc Reversat, Lecture on rigid geometry (143--151); E.-U. Gekeler, Moduli for Drinfeld modules (153--170); Yuichiro Taguchi, Ramifications arising from Drinfeld modules (171--187); Jeremy Teitelbaum, Rigid analytic modular forms: an integral transform approach (189--207); E.-U. Gekeler and M. Reversat, Some results on the **Jacobians** of Drinfeld modular curves (209--226); David Goss, Some integrals attached to modular forms in the theory of function fields (227--251); Jing Yu, Transcendence in finite characteristic (253--264); Alain Thiery, Independance algebrique des periodes et quasi-periodes d'un module de Drinfeld [Algebraic independence of periods and quasiperiods of a Drinfeld module] (265--284); L. Denis, Geometrie diophantienne sur les modules de Drinfeld [Diophantine geometry on Drinfeld modules] (285--302); G. Damamme, Transcendence properties of Carlitz zeta-values (303--311); David Goss, L-series of t-motives and Drinfeld modules (313--402); R. J. Chapman, Classgroups of sheaves of locally free modules over global function fields (403--411); E. de Shalit, Artin-Schreier-Witt extensions as limits of Kummer-Lubin-Tate extensions, and the explicit reciprocity law (413--420); M. Car, The circle method and the strict Waring problem in function fields (421--433); L. N. Vaserstein, Ramsey's theorem and Waring's problem for algebras over fields (435--441); G. Payne and L. Vaserstein, Sums of three cubes (443--454); Da Qing Wan, Heights and zeta functions in function fields (455--463); C. Friesen, Continued fraction characterization and generic ideals in real quadratic function fields (465--474); David Goss, Dictionary (475--482).
{Most of the papers are being reviewed individually.}
Reviewer: Editors
Review Type: Table of contents
Descriptors: *11-06 -Number theory-Proceedings, conferences, collections, etc. ; 11G09 -Number theory-Arithmetic algebraic geometry (Diophantine geometry) (See also 11Dxx, 14Gxx, 14Kxx)-Drinfel\cprime d modules; higher-dimensional motives, etc. (See also 14L05); 11R58 -Number theory-Algebraic number theory: global fields (For complex multiplication, see 11G15)-Arithmetic theory of algebraic function fields (See also 14-XX)

7/5/4 (Item 4 from file: 239)
DIALOG(R)File 239:Mathsci

02140494 MR 90f#11002
Theorie des nombres.
Number theory
Proceedings of the International Conference held at the Universite Laval, Quebec, Quebec, July 5--18, 1987. Edited by Jean-Marie De Koninck and Claude Levesque.
Contributors: De Koninck, Jean-Marie; Levesque, Claude
Publ: Walter de Gruyter & Co., Berlin-New York, 1989, xxii+1002 pp. ISBN: 3-11-011791-6
Price: $144.00.
Language: English
Document Type: Book; Proceedings
Journal Announcement: 9004
Number theory; Theorie des nombres; Quebec, PQ,; Conference: Number Theory, 1987 International
Subfile: MR (Mathematical Reviews) AMS

'Abstract.Length: LONG (137 lines)
Contents:\ L. J. Alex and L. L. Foster, Exponential Diophantine equations (pp. 1--6); A. Arenas, Quantitative aspects of the representations of integers by quadratic forms (pp. 7--14); R. C. Baker, Diagonal cubic equations. I (pp. 15--28); Daniel Berend, Irrational dilations of approximate multiplicative semigroups of integers (pp. 29--40); Rolf Berndt, Some special features of the **Jacobi** group (pp. 41--50); M.-J. Bertin, Generalisation de suites de Pisot et de suites de Boyd [Generalization of Pisot sequences and Boyd sequences] (pp. 51--56); David W. Boyd, Salem numbers of degree four have periodic expansions (pp.\ 57--64); J. L. Brenner and R. J. List, Applications of partition theory to groups: covering the alternating group by products of conjugacy classes (pp. 65--71); Gregory S. Call, Variation of local heights on an algebraic family of abelian varieties (pp. 72--96); Henri Cohen, Sur une fausse forme modulaire liee a des identites de Ramanujan et Andrews [On a false modular form associated with the Ramanujan and Andrews identities] (pp. 97--107).

David R. Dorman, Global orders in definite quaternion algebras as endomorphism rings for reduced CM **elliptic** curves (pp. 108--116); Michael Drmota and Robert F. Tichy, Distribution properties of continuous curves (pp. 117--127); D. S. Dummit, On the torsion in quotients of the multiplicative groups in abelian extensions (pp. 128--132); A. G. Earnest, Binary quadratic forms over rings of algebraic integers: a survey of recent results (pp. 133--159); Michel Emsalem, Places totalement decomposees dans des ${\bf Z}\sb p$-extensions d'un corps de nombres [Totally split places in ${\bf Z}\sb p$-extensions of a number field] (pp. 160--168); Paul Erdos and Jean-Louis Nicolas, Grandes valeurs de fonctions liees aux diviseurs premiers consecutifs d'un entier [Large values of functions associated with the consecutive prime divisors of an integer] (pp. 169--200); J. Fabrykowski and M. V. Subbarao, The maximal order and the average order of multiplicative function $\sigma\sp {(e)}(n)$ (pp. 201--206); Henri Faure, Discrepance quadratique de suites infinies en dimension un [Quadratic discrepancy of infinite sequences in dimension one] (pp.\ 207--212); Mary E. Flahive, Integral solutions of linear systems (pp. 213--219); John B. Friedlander, Fractional parts of sequences (pp. 220--226).

Eduardo Friedman and Lawrence C. Washington, On the distribution of divisor class groups of curves over a finite field (pp. 227--239); Akio Fujii, Diophantine approximation, Kronecker's limit formula and the Riemann hypothesis (pp. 240--250); Paul Gerardin, Le theoreme de Riemann-Roch et les corps de nombres algebriques [The Riemann-Roch theorem and algebraic number fields] (pp.\ 251--266); Paul Gerardin and Wen-Ch'ing Winnie Li, Functional equations and periodic sequences (pp. 267--279); R. Gold and H. Kisilevsky, ${\bf Z}\sb p$-extensions of function fields (pp.\ 280--289); Daniel M. Gordon, Pseudoprimes on **elliptic** curves (pp. 290--305); Andrew Granville, Least primes in arithmetic progressions (pp. 306--321); Cornelius Greither, Cyclic Galois extensions and normal bases (pp. 322--329); S. Gurak, Cubic and biquadratic pseudoprimes of Lucas type (pp. 330--347); J. L. Hafner and A. Ivic, On some mean value results for the Riemann zeta-function (pp. 348--358).

Charles Helou, Classical explicit reciprocity (pp. 359--370); Doug Hensley, The distribution of badly approximable numbers and continuants with bounded digits (pp. 371--385); Noriko Hirata [Noriko Hirata-Kohno], Approximation de periodes de fonctions meromorphes [Approximation of periods of meromorphic functions] (pp.\ 386--397); Jeff Hoffstein and M. Ram Murty, L-series of automorphic forms on ${\rm GL}(3,{\bf R})$ (pp. 398--408); Marc Huttner, Equations differentielles Fuchsiennes et approximations diophantiennes [Fuchsian differential equations and Diophantine approximations] (pp. 409--416); M. N. Huxley, Exponential sums and the Riemann zeta function (pp. 417--423); Aleksandar Ivic, Some recent results on the Riemann zeta-function (pp.\ 424--440); C. U. Jensen, On the representations of a group as a Galois group over an arbitrary field (pp. 441--458); S. Kanemitsu, On evaluation of certain limits in closed form (pp. 459--474); Ernst Kani, Potential theory on curves (pp. 475--543); I. Katai, Characterization of arithmetical functions, problems and results (pp. 544--555).

H. Kisilevsky and J. Labute, On a sufficient condition for the p-class

tower of a CM-field to be infinite (pp. 556--560); E. Lamprecht, Calculation of general Gauss sums and quadratic Gauss sums in finite rings (pp. 561--573); M. Langevin, E. Reyssat and G. Rhin, Transfinite diameter and Favard's problems on diameters of algebraic integers (pp. 574--578); Ben Lichtin, Poles of Dirichlet series and D-modules (pp. 579--594); Ming Chit Liu and Kai Man Tsang, Small prime solutions of linear equations (pp. 595--624); Helmut Maier and Carl Pomerance, Unusually large gaps between consecutive primes (pp. 625--632); Hiroo Miki, On the congruence for Gauss sums and its applications (pp.\ 633--641); Katsuya Miyake, On central extensions (pp. 642--653); R. A. Mollin and H. C. Williams [Hugh Cowie Williams], Prime producing quadratic polynomials and real quadratic fields of class number one (pp.\ 654--663).

R. Morikawa, Disjoint systems of rational Beatty sequences (pp. 664--670); Hans H. Muller [Hans Helmut Muller], Harald Stroher and Horst G.\ Zimmer, Complete determination of all torsion groups of **elliptic** curves with integral absolute invariant over quadratic and pure cubic fields (pp.\ 671--698); Helmut Muller, On generalized zeta-functions (pp. 699--702); T. Nadesalingam and Jane Pitman, Bounds for solutions of simultaneous diagonal equations of odd degree (pp. 703--734); Melvyn B. Nathanson, Long arithmetic progressions and powers of 2 (pp.\ 735--739); Thong Nguyen Quang Do [Nguyen-Quang-Djo Thong], Sur la cohomologie de certains modules galoisiens p-ramifies [On the cohomology of certain p-ramified Galois modules] (pp. 740--754); Werner Georg Nowak, On Euler's ϕ-function in quadratic number fields (pp. 755--771); Michio Ozeki, Ternary code construction of even unimodular lattices (pp.\ 772--784); Y.-F. S. Petermann, On the distribution of values of an error term related to the Euler function (pp. 785--797); Patrice Philippon and Michel Waldschmidt, Formes lineaires de logarithmes elliptiques et mesures de transcendance [Linear forms in **elliptic** logarithms and transcendence measures] (pp. 798--805).

Jukka Pihko, On a question of Tverberg (pp. 806--810); K. Ramachandra, Titchmarsh series (pp. 811--814); Michael Rosen and Karl Zimmermann [Karl Frederic Zimmermann], Galois representations associated to generic formal groups (pp. 815--822); Victor Snaith, A local construction of the local root numbers (pp. 823--840); Lawrence Somer, On Fermat d-pseudoprimes (pp. 841--860); Alan H. Stein, Exponential sums of digit counting functions (pp. 861--868); A. J. Stephens and H. C. Williams [Hugh Cowie Williams], Some computational results on a problem of Eisenstein (pp. 869--886); Glenn Stevens, The Eisenstein measure and real quadratic fields (pp.\ 887--927); M. V. Subbarao and L.-W. Yip, Carmichael's conjecture and some analogues (pp. 928--941); Robert Tubbs, The algebraic independence of three numbers: Schneider's method (pp. 942--967); Robert G. Van Meter, The number of solutions of certain equations of the form $f({\bf x}\sb m)=g({\bf y}\sb n)$ over a finite field (pp. 968--980); R. V. Wallisser, On entire functions assuming integer values in a geometric sequence (pp. 981--989); Lawrence C. Washington, **Stickelberger** 's theorem for cyclotomic fields, in the spirit of Kummer and Thaine (pp. 990--993); Thomas Wyler, A propos d'un lemme de K. Kato sur le groupe de Brauer en caracteristique p [Concerning a lemma of K. Kato on the Brauer group in characteristic p] (pp. 994--1002).

{The papers are being reviewed individually.}\
Reviewer: Editors
Review Type: Table of contents
Descriptors: *11-06 -Number theory-Proceedings, conferences, etc.

7/5/5 (Item 5 from file: 239)
DIALOG(R)File 239:Mathsci

01749816 MR 84h#12009
Modular units.
Kubert, Daniel S.
Lang, Serge
Publ: Springer-Verlag, New York-Berlin,
1981, xiii+358 pp. ISBN: 0-387-90517-0
Series: Grundlehren der Mathematischen Wissenschaften [Fundamental

Principles. of Mathematical Science], 244.
Price: $38.00.
Language: English
Document Type: Book
Journal Announcement: 1413
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (70 lines)

Consider the functions on the modular curve X(N) and the integral closure of Z[j] (j=modular invariant) in it; modular units are units in this ring. They correspond to functions without zero or pole in the Poincare half- plane. This book is devoted to their study, with some interesting applications to the group of cuspidal divisors and the study of **elliptic** units. It is the synthesis of a long series of papers by the authors and provides an introduction to Robert's theory of **elliptic** units with some new improvements by Kersey. Chapter 1 gives the theory of distributions and **Stickelberger** ideal in the setting of the Cartan group. This group is a product over the prime numbers; each component is isomorphic to the group of units in the 2-dimensional unramified field extension of Q{sub}p. Chapter 2 introduces the Klein forms (variants of the Weierstrass sigma-function) and Siegel functions, shows that they are modular units and proves that the divisor of the Siegel functions can be used to construct the universal distribution of the Cartan group. It gives Robert's result about norms of the Siegel functions, making precise the relationship with their divisors. Chapter 3 introduces the notion of quadratic relations and uses it to say precisely when a product of Klein forms (or Siegel functions) is modular of level N{in}N. Chapter 4 proves that the Siegel functions give all the modular units when the level is a power of a prime{neq}2, 3. It uses q-developments. Chapter 5 [resp. 6] studies the group (finite) generated by the cusps in the **Jacobian** of X(N) [resp. X{sub}1(N)]. The group algebra of the Cartan group operates on it; it is cyclic for this action, and the annihilator is given in terms of the **Stickelberger** ideal of Chapter 1. The order of the cuspidal group is computed. Note that part of this theory is used in the Mazur - Wiles theorem proving Iwasawa's conjecture. Chapter 7 shows that the modular units remain independent when specialized to a Tate curve, if the Galois group is big enough. Chapter 8 studies the link with the Fermat curve: it shows that the curve x{sup}n+y{sup}n=1 is Mordellic if and only if the modular curve X(2n) is so. It also gives Kubert's existence theorem of a bound on the torsion of an **elliptic** curve on an algebraic number field. Note that every curve of genus > 1 is Mordellic by a recent famous theorem of Faltings, so certain arguments can now be simplified. Chapter 9 introduces the group of Robert's **elliptic** units for abelian nonramified extensions of a fixed imaginary quadratic field and gives the formula relating the class number and the index of the group of **elliptic** units in the whole group of units. Chapter 10 begins by a classical computation expressing the pseudoperiods eta (omega) of the Weierstrass zeta function of an **elliptic** curve in terms of s{sub}2=lim {sum} omega {sup}(- 2){vert} omega {vert}{sup}(- 2s), s {arrr}0{sup}+. It gives also formulas for special quotients of Klein forms. Chapter 11 gives Robert's theory of **elliptic** units for abelian ramified extensions, the counterpart of Chapter 9 in that case. It uses Klein forms for introducing them and Shimura reciprocity for writing the action of the Galois group. Chapter 12 gives Kersey's improvement of Robert's theory. It uses the precise study of Klein forms of the first chapters of the book. It is more technical, so it is a good choice to have written Chapter 11 independently. Chapter 13 applies the preceding chapters to the class number formula for abelian extensions of a quadratic imaginary field in the case of conductor equal to a power of a prime ideal. It improves Robert's theorem [G. Robert, Unites elliptiques, Bull. Soc. Math. France, Mem. No. 36, Soc. Math. France, Paris, 1973; MR 57#9669] by dispensing with fuzzy factors of type 2{sup}a {cdot}3{sup}b. This is more natural since it uses Sinnott's method of computation. In summary, this book gives a nice account on quite technical results which were available only in many different papers. It provides a good introduction to the theories of cuspidal groups on modular curves and of **elliptic** units.
Reviewer: Gillard, Roland (Saint Martin d'Heres)

Review Type: Signed review
Descriptors: *12A45 -Field theory and polynomials-Algebraic number theory: global fields (For complex multiplication, see 10D25.)-Units and factorization ; 10D05 -NUMBER THEORY (Excluding 10Axx and 10Mxx, this classification scheme does not distinguish work in the rational number fields from that in other algebraic number fields.)-Automorphic theory-Modular functions and groups; 14G25 -Algebraic geometry-Arithmetic problems. Diophantine geometry (See also 11Dxx, 11Gxx)-Global ground fields

7/5/6 (Item 6 from file: 239)
DIALOG(R)File 239:Mathsci

01718598 MR 83g#12001
A classical introduction to modern number theory.
Revised edition of Elements of number theory.
Ireland, Kenneth F.
Rosen, Michael I.
Publl: Springer-Verlag, New York-Berlin,
1982, xiii+341 pp. ISBN: 0-387-90625-8
Series: Graduate Texts in Mathematics, 84.
Price: $28.00.
Language: English
Document Type: Book
Journal Announcement: 1420
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (90 lines)
This book is a considerably expanded new edition of the authors' Elements of number theory, including an introduction to equations over finite fields [Bogden & Quigley, Tarrytown-on-Hudson, N.Y., 1972; MR 58#27701]. The original edition, in 156 pages of text, took the reader from the definition of prime number to a proof of the rationality of the zeta function associated to the hypersurface over GF(q) defined by f(x{sub}0, x{sub}1, ... ,x{sub}n)=a {sub}0x{sub}0{sup}m+a{sub}1x{sub}1{sup}m+ ... +a{sub}nx{sub}n{sup}m when q {iden}1 (mod m). The new edition is roughly twice as long, and contains the first edition, with a few additions, as the first 11 of its 18 chapters. The book is an invitation to certain current themes in number theory, rather than being, like Bourbaki or Hilbert's ``Zahlbericht'', a comprehensive treatise. There are three main topics: explicit reciprocity laws, Diophantine equations, and zeta functions. The authors' aim is to move rapidly and economically through the necessary prerequisites to reach the results they wish to expose. Thus the researcher seeking a systematic exposition of algebraic number theory, or local fields, or class field theory, will find the book of little value. But the reader wishing to understand historical antecedents and special cases of Artin reciprocity or the Weil conjectures (for example) will find the book uniquely attractive. Here are some of the main results: Quadratic reciprocity is first stated and proved, following Eisenstein, in Chapter 5. Other proofs are given in Chapter 6, using Gauss sums; in Chapter 7 using finite fields; and in Chapter 13 using cyclotomic fields, following Kronecker. Cubic reciprocity is given two proofs, both using Gauss and **Jacobi** sums, and biquadratic reciprocity is also proved, following Eisenstein, in Chapter 9. In Chapter 14 the Eisenstein reciprocity law for the lth power residue symbol, l an odd prime, is proven via **Stickelberger** 's theorem on factorization of Gauss sums into products of primes. Eisenstein reciprocity in turn is applied to obtain Wieferich's criterion for the first case of Fermat's last theorem, and to prove a local- global criterion for an integer to be an lth power. Diophantine equations appear first over finite fields, where in Chapter 8 **Jacobi** sums are used to count the number of solutions of x{sup}n+y{sup}n=1 in GF(p), p{iden}1 (mod n), and, more generally, of a{sub}1x{sub}1{sup}(l {sub}1)+ ... +a{sub}rx{sub}r{sup}(l{sub}r)=b in GF(p). The Chevalley - Warning theorem is proved in Chapter 10. These results motivate the definition of the zeta function of a projective hypersurface f=0, defined in terms of the number of solutions of f=0 in

GF(q{sup}s), s > 0. Chapter 11 presents the result on rationality of the zeta function cited above. The Fermat equation motivates much of the latter part of the book. Following the proof of Wieferich's criterion, a study of Bernoulli numbers in Chapter 15 yields the Voronoi and Kummer congruences, which in turn lead to a proof of Carlitz' result that there exist infinitely many irregular primes. **Stickelberger** 's theorem is applied to obtain Herbrand's refinement of Kummer's result on regular primes l, namely, if a certain Bernoulli number is prime to l, then a corresponding direct summand of the l-torsion part of the class group of the cyclotomic field of lth roots of unity is trivial. Chapter 17 surveys some of the classical Diophantine equations found in many elementary books, but also continues the study of the Fermat equation, with Sophie Germain's theorem, proofs of the theorem for exponents 3 and 4, and a proof of the first case of the Fermat theorem for regular prime exponents. Zeta functions, first defined for hypersurfaces over finite fields and for Q, are considered, together with L-series, in Chapter 16, in order to prove Dirichlet's theorem on primes in arithmetic progressions. The zeta function of the Gaussian integers arises in connection with counting solutions of x {sup}2+y{sup}2=n in Chapter 17. After examining rational points of certain **elliptic** curves in Chapter 17, the authors define local and global zeta functions for **elliptic** curves in Chapter 18, and, using Hecke L-functions, they obtain special cases of the Hasse - Weil conjecture on analytic continuation of the global zeta function. As in the first edition, each chapter contains a page or more of valuable historical commentary and references, and an extensive set of exercises. The bibliography contains 248 entries.
The overall point of view of the book is very much that of the first half of the 19th century -- almost a homage to Gauss and Eisenstein. Gauss and **Jacobi** sums dominate, and, for example, even Hilbert's 1897 treatment of the **Stickelberger** relation (proved via Kronecker's theorem on abelian extensions) feels more ``modern'' than the proof (following Davenport and Hasse) chosen by the authors. But such a classical point of view gives the book a distinctive niche in the expository literature. Many mathematicians of this generation have reached the frontier of research without having a good sense of the history of their subject. In number theory this historical ignorance is being alleviated by a number of fine recent books. This work stands among them as a unique and valuable contribution.

Reviewer: Childs, Lindsay N. (Albany, N.Y.)
Review Type: Signed review
Descriptors: *12-01 -Field theory and polynomials-Instructional exposition (textbooks, tutorial papers, etc.) ; 10-01 -NUMBER THEORY (Excluding 10Axx and 10Mxx, this classification scheme does not distinguish work in the rational number fields from that in other algebraic number fields.)-Elementary exposition (collegiate level)

7/5/7 (Item 7 from file: 239)
DIALOG(R)File 239:Mathsci

01687937 MR 82m#10006
Seminaire de Theorie de Nombres, 1980--1981.
Seminar on Number Theory, 1980--1981
Held at the Universite de Bordeaux I, Talence, during the academic year 1980--1981.
Publ: Universite de Bordeaux I, U.E.R. de Mathematiques et d'Informatique, Laboratoire de Theorie des Nombres, Talence, 1981, 264 pp. (not consecutively paged).
Language: French
Document Type: Book; Proceedings
Journal Announcement: 1411
Seminar: Number Theory; Talence, 1980/1981
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (66 lines)
The previous seminar has been reviewed (MR 81m:10005).)
Contents: Bernard de Mathan, Quelques remarques sur la conjecture de

Littlewood (en approximations diophantiennes simultanees) (Some remarks on Littlewood's conjecture (in simultaneous Diophantine approximations)) (Exp. No. 1, 20 pp.); Benedict H. Gross, The annihilation of divisor classes in abelian extensions of the rational function field (Exp. No. 3, 5 pp.); Eric Reyssat, Transcendance et fonctions elliptiques (Transcendence and **elliptic** functions) (Exp. No. 4, 14 pp.); Jean-Marc Deshouillers, Theorie additive et geometrie des nombres (Additive number theory and geometry of numbers) (Exp. No. 5, 3 pp.); Michel Matignon and Marc Reversat, Sur les automorphismes d'extensions transcendantes de corps values (On the automorphisms of transcendental extensions of valued fields) (Exp. No. 6, 16 pp.); Marius van der Put, Groupes discrets de quaternions (Discrete groups of quaternions) (Exp. No. 7, 14 pp.); B. Dwork, Hypergeometric functions as p-adic analytic functions (Exp. No. 8, 6 pp.); Francois Gramain, Sur le theoreme de Fukasawa - Gel'fond (On the Fukasawa - Gel'fond theorem) (Exp. No. 9, 10 pp.); F. Beukers, Pade-approximations in number theory (Exp. No. 10, 9 pp.); Gerald Tenenbaum, Sur la densite divisorielle d'une suite d'entiers (On the divisorial density of a sequence of integers) (Exp. No. 13, 6 pp.); Daniel Bertrand, Representations des corps de nombres et theorie de Baker (Representations of number fields and Baker's theory) (Exp. No. 14, 6 pp.); Christophe Soule, K-theorie et corps cyclotomiques (K-theory and cyclotomic fields) (Exp. No. 15, 6 pp.); Henri Cohen, Acceleration de la convergence de certaines recurrences linéaires (Acceleration of the convergence of certain linear recurrences) (Exp. No. 16, 2 pp.); Jacques Peyriere, Substitutions aleatoires iterees (Iterated random substitutions) (Exp. No. 17, 9 pp.); Martin Huxley, Estimating lim inf((p{sub}(n+r) - p{sub}n)/log p{sub}n) (Exp. No. 18, 10 pp.); S. M. J. Wilson, Extensions with identical wild ramification (Exp. No. 20, 7 pp.); Jean-Francois Jaulent, Theorie d'Iwasawa des tours metabeliennes (Iwasawa theory of metabelian towers) (Exp. No. 21, 16 pp.); Pierrette Cassou - Nogues, Series de Dirichlet (Dirichlet series) (Exp. No. 22, 14 pp.); Hyman Bass, Applications polynomiales a **jacobienne** constante (Polynomial mappings with constant **Jacobian**) (Exp. No. 23, 6 pp.); John Tate, Brumer - Stark - **Stickelberger** (Exp. No. 24, 16 pp.); Lawrence C. Washington, Zeros of p-adic L-functions (Exp. No. 25, 4 pp.); Andre Weil, Sur l'histoire des equations indeterminees de genre 1 depuis Diophante (On the history of indeterminate equations of genus 1 since Diophantos) (Exp. No. 26, 3 pp.); Mohan Nair, A new method in the elementary theory of primes (Exp. No. 27, 7 pp.); Kun Rui Yu, Two results in metrical Diophantine approximation (Exp. No. 28, 8 pp.); R. Tijdeman, Multiplicities of binary recurrences (Exp. No. 29, 11 pp.); Iekata Shiokawa, On irrationality of the values of certain series (Exp. No. 30, 15 pp.); Iekata Shiokawa, Correction to my paper: ''Arithmetic properties of certain power series with algebraic coefficients'' (Seminar on Number Theory, 1979 - 1980 (French), Exp. No. 27, Univ. Bordeaux I, Talence, 1980) (Exp. No. 30bis, 1 p.); F. M. Dekking, On the structure of self- generating sequences (Exp. No. 31, 6 pp.); David Goss, The arithmetic of function fields (Exp. No. 32, 11 pp.). The exposes that were not submitted in written form were by Marc Laborde (``Almost primes in small intervals''), Gerard Viennot (``Combinatorial interpretation of Euler and Genocchi numbers'' (to appear in the 1981 - 1982 seminar)), A. Wiles (``The main conjecture of Iwasawa theory''), and Gerard Rauzy (``Algebraic numbers and permutations''). (The papers which appear to be in final form are being reviewed individually.)

Reviewer: Editors

Review Type: Table of contents

Descriptors: *10-06 -NUMBER THEORY (Excluding 10Axx and 10Mxx, this classification scheme does not distinguish work in the rational number fields from that in other algebraic number fields.)-Collections of papers; proceedings of conferences ; 12-06 -Field theory and polynomials-Proceedings, conferences, collections, etc.

7/5/8 (Item 8 from file: 239)

DIALOG(R)File 239:Mathsci

01437517. MR 55##10424c
Units in the modular function field. III. Distribution relations.
Kubert, Dan
Lang, Serge
Math. Ann.
1975, 218, no. 3, 273--285.
Language: English
Document Type: Journal
Subfile: MR (Mathematical Reviews) AMS
Abstract Length: LONG (80 lines)
For a given natural number N, let $X(N)$ be the ``modular curve'' associated naturally with the principal congruence subgroup of level N in the **elliptic** modular group. Let $F\sb N$ be the function field of $X(N)$ over the cyclotomic field of Nth roots of unity. Let ${\bf Z}[j]$ be the ring generated over ${\bf Z}$ by the **elliptic** modular invariant j and let $R\sb N$ be the affine ring which is the integral closure of ${\bf Z}[j]$ in $F\sb N$. Let $k\sb N$ be the algebraic closure of ${\bf Q}$ in the quotient field of $R\sb N$.

This important series of papers is concerned with units of a special type in $R\sb N$ with their applications, in particular, to Diophantine problems.

Let $\Phi\sb n$ denote the Fermat curve defined by the equation $x\sp n+y\sp n=1$. By constructing units u,v in $R\sb N$ such that $u+v=1$ and taking the nth roots of u and v, a correspondence is established between modular curves and Fermat curves. An interesting deduction is that, for $N\geq 3$, the affine curve naturally associated with $R\sb N$ has only finitely many points over a given finitely generated ${\bf Z}$-module contained in $k\sb N$.

The Fermat curve $\Phi\sb n$ (for $n\geq 3$) is shown to be Mordellic (i.e., having only finitely many rational points over a given algebraic number field) if and only if the modular curve $X(2N)$ is Mordellic. The idea of constructing a correspondence as mentioned above perhaps goes back to Chabauty who, in his proof of Siegel's theorem on the finiteness of the number of integral points on **elliptic** curves, constructed between an **elliptic** curve E and a Fermat curve, a correspondence unramified over E except at infinity. The authors point out that for general curves, the corresponding proof of Chabauty is invalid.

Units u,v in $R\sb N$ as mentioned above are constructed in Part I, using differences of Weierstrass functions. (The case of level 2 is the simplest; here, as the authors mention, one can take for u, the generator $\lambda=(e\sb 2-e\sb 3)/(e\sb 1-e\sb 3)$ for $F\sb 2$ with $e\sb 1,e\sb 2,e\sb 3$ having the same meaning as in the theory of **elliptic** functions.) It is shown in Part II that units can also be constructed by using quotients of normalised sigma functions (referred to as Klein forms and closely related to what are called Siegel functions). A reciprocity law for such units when the invariant j is specialised to be an algebraic integer (e.g., in the case of complex multiplication) is also considered. Corresponding to a pair $\alpha=(r,s)$ of integers r, s modulo N not both being divisible by N and a period lattice $L=\omega\sb 1{\bf Z}+\omega\sb 2{\bf Z}$, the Klein form $k\sb \alpha=k\sb \alpha(\omega\sb 1,\omega\sb 2)$ is defined to be $$ \exp(-(r\eta\sb 1+s\eta\sb 2)(r\omega\sb 1+s\omega\sb 2)/N\sp 2)\sigma(r\omega\sb 1+s\omega\sb 2)/N;\omega\sb 1,\omega\sb 2), $$ where σ is the sigma function and $\eta\sb 1,\eta\sb 2$ the corresponding quasi-periods of the Weierstrass zeta function associated with L. If $(r,s,N)=1$, then α is called primitive modulo N; further $\alpha=(r,s)$ is identified with $(-r,-s)$. To each element of a complete set S of such α, associate a Klein form $k\sb \alpha$; to each $k\sb \alpha$, in turn, associate an order vector $(\cdots,\text{Ord}\sb p\,k\sb \alpha,\cdots)$, where P denotes a prime at infinity on $F\sb N$ and $\text{Ord}\sb p\,k\sb \alpha$ is the order of $k\sb \alpha$ at P. The order vectors corresponding to $k\sb \alpha$ for α in S form a matrix M. The system $\{k\sb \alpha\}$ is full if and only if M has rank equal to the number of points at infinity of $F\sb N$. For N equal to a prime power, the system $\{k\sb \alpha{}\sp {2N}\}\sb {\alpha\in S}$ is shown to be full. The proof of the ``fullness'' is completed (in a purely algebraic fashion) in a subsequent paper [the authors, Math. Z. 148 (1976), no. 1, 33--51; MR 53\#5479] by

explicit evaluation of associated character sums which involves generalised Bernoulli numbers. For composite N, products of Klein forms have to be taken, to get a full system. A by-product is a new proof of the Manin-Drinfeld theorem about points at infinity on the **Jacobian** of $X(N)$ being of finite order.

Part III deals, among other things, with an analogue of a ``**Stickelberger** element annihilating the divisor classes at infinity on $X(N)$'' and using the relation between the units to associate a distribution in the sense of Mazur to the Siegel functions $g\sb \alpha(\tau)=k\sb \alpha(\tau,1)\eta\sp 2(\tau)$, where $\text{Im}\,\tau>0$ and η is Dedekind's eta function; further, this distribution is shown to be ``universal'' (in view of the maximality of the rank of the units).

Reviewer: Raghavan, S.

Review Type: Signed review

Descriptors: *12A45 -Field theory and polynomials-Algebraic number theory: global fields (For complex multiplication, see 10D25.)-Units and factorization ; 12A90 -Field theory and polynomials-Algebraic number theory: global fields (For complex multiplication, see 10D25.)-Arithmetic theory of algebraic function fields (See also 14--XX.); 10D05 -NUMBER THEORY (Excluding 10Axx and 10Mxx, this classification scheme does not distinguish work in the rational number fields from that in other algebraic number fields.)-Automorphic theory-Modular functions and groups; 14G25 -Algebraic geometry-Arithmetic problems. Diophantine geometry (See also 11Dxx, 11Gxx)-Global ground fields